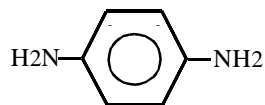


p-PHENYLENEDIAMINE

p-Phenylenediamine is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 106-50-3

Molecular Formula: $C_6H_8N_2$



p-Phenylenediamine exists in the form of white to slightly-red crystals, and will darken on exposure to air. It is soluble in alcohol, chloroform, hot benzene, and cold water (Merck, 1983). It is combustible at high temperatures (Sax, 1987).

Physical Properties of p-Phenylenediamine

Synonyms: 1,4-benzenediamine; p-diaminobenzene; p-aminoaniline; orsin

| | |
|---------------------------|--------------------|
| Molecular Weight: | 108.14 |
| Boiling Point: | 267 °C |
| Melting Point: | 145 - 147 °C |
| Flash Point: | 155 °C (312 °F) |
| Vapor Density: | 3.72 (air = 1) |
| Density/Specific Gravity: | > 1 at 20/4 °C |
| Vapor Pressure: | < 1 mm Hg at 21 °C |

(HSDB, 1991; Merck, 1983; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

p-Phenylenediamine is used in the manufacturing of diisocyanates for polyurethanes and as an intermediate in the manufacturing of antioxidants and accelerators for rubber (HSDB, 1991). It is also used in the manufacturing of azo dyes and as a component of dye mixtures for hair and fur. p-Phenylenediamine and its derivatives are also used as developers for black-and-white and color photographs (U.S. EPA, 1994a).

The primary stationary sources that have reported emissions of p-phenylenediamine in California are manufacturers of guided missiles and space vehicles (ARB, 1997b).

B. Emissions

Toxic Air Contaminant Identification
List Summaries - ARB/SSD/SES

September 1997

The total emissions of p-phenylenediamine from stationary sources in California are estimated to be at least 4 pounds per year based on data obtained from the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

p-Phenylenediamine is not known to occur as a natural product (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of p-phenylenediamine.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of p-phenylenediamine was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

If p-phenylenediamine is released to the atmosphere it will be subject to direct photolysis and reaction with the hydroxyl (OH) radical. By analogy with experimental data for 2,4- and 2,6-toluene diamine (Becker et al., 1988), p-phenylenediamine is expected to react rapidly with the OH radical in the gas phase, leading to a half-life and lifetime of a few hours (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

p-Phenylenediamine emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to p-phenylenediamine are inhalation and dermal contact (HSDB, 1991).

Non-Cancer: Exposure to p-phenylenediamine may cause eye, skin, and respiratory tract irritation including inflammatory reactions of the larynx and pharynx. It also may cause skin and respiratory tract sensitization (HSDB, 1991).

The United States Environmental Protection Agency (U.S. EPA) has not established a Reference Concentration (RfC) or an oral Reference Dose (RfD) for p-phenylenediamine.

No information is available on adverse developmental or reproductive effects of p-phenylenediamine in humans. In one study of rats exposed by gavage, no significant increase in malformations or developmental variations were found in fetal evaluations at any dose tested (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of p-phenylenediamine in humans. The U.S. EPA has not classified p-phenylenediamine with respect to carcinogenicity (U.S. EPA, 1994a). The International Agency for Research on Cancer has placed para-phenylenediamine in Group 3: Not classifiable as to its carcinogenicity to humans (IARC, 1987a).

